

Growing
BEGONIAS
in California

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BEGONIAS ARE tender tropical plants with exacting requirements. They are successfully grown both outdoors and indoors in California, wherever temperature, moisture, and soil are suitable, and if fertilizing, pruning, and winter protection are provided. Where only one fibrous-rooted variety, *Begonia manicata*, was listed

in a California nursery catalog for 1858, some eight different classes with their many varieties can now be described. This increase has come about primarily through hybridizing, which is responsible for the majority of popular classes now grown, including fibrous, foliage, bedding, and tuberous.

Care of Fibrous-rooted and Foliage Types

Temperature and Moisture. Most begonias thrive in a temperature between 60° and 70° F, with the atmosphere moderately moist. Fibrous begonias prefer half shade without wind or draft.

Of the rex varieties some apparently require more ventilation than a humid greenhouse can offer, and some do well with a minimum temperature of 55° F. Still others thrive even in a lath house in the warm, frost-free coastal district of southern California.

Potted begonias may be grown in a sun porch if moisture, temperature, and light are satisfactory. Pots can also be partly buried in the ground during the summer, and protected against sun and wind.

Soil and Fertilizer. Fibrous-rooted and foliage begonias thrive in a soil consisting of 2 parts oak-leaf mold, 1 part sandy loam soil, and 1 part well-rotted cow manure. If oak-leaf mold is not available, use a mixture of well-rotted sod or turfy loam and add ½ ounce of super-saturated alum to each gallon of water to acidify the soil. Avoid alkaline soils and irrigation water that contains a considerable amount of chlorine.

When preparing pots for plants, use the same proportion of oak-leaf mold, sandy loam soil, and well-rotted cow manure. Two or 3 tablespoons of bone meal and 1 teaspoon of ammonium phosphate may be added to the mixture for a 5-inch pot. Include a small amount of granulated charcoal if drainage is faulty. This mixture drains well, is sufficiently acid, and contains enough plant food for satisfactory growth. Remember that new roots tend to form above old roots, so use a roomy pot and plenty of soil. Repot older plants with new soil and, if necessary, in larger pots.

With both young and old plants, use a nitrogen fertilizer sparingly—if at all. Well-rotted cow manure is a satisfactory source of nitrogen.

Irrigation and Drainage. If a plant shipped some distance arrives with dry roots, soak the roots in water about 12 hours. Then pot the plant or set it out under lath or in a protected spot. Water it thoroughly, then do not add more water until it has absorbed most of the available moisture. Do not keep the soil about the roots saturated. Good drainage is essential.

After irrigating a potted plant, never let it stand in water. If the lower part of the pot stays too wet, the roots in that portion will decay or will fail to develop. If the pot is in a saucer or other container, pour off all water not absorbed by the soil within 20 to 30 minutes after irrigating.

Tillage. Fibrous-rooted begonias are naturally shallow rooted and require no cultivation. As the plant continues to grow from year to year, the roots tend to mat near the surface. Some growers even suggest gradually building up the soil over the top of the surface roots.

Supporting. Stake most of the tree-type begonias to hold them upright. Use a fairly substantial redwood stake, and tie the plant to the stake with raffia, cord, or with one of the special fasteners now available. Support the smaller, weak-stemmed plants with stained bamboo stakes sold at all nurseries. Bamboo is less permanent than redwood, however, as it tends to rot off at the base.

Suspend the container holding the pendent type of both fibrous and tuberous varieties from the roof of the lath house

or the greenhouse, or place it on a pedestal. Leave plenty of room for the hanging stems to develop more or less unrestrictedly.

Pruning. Prune fibrous begonias according to the variety. Very tall tree begonias become too leggy for house use. Occasionally pinch back their growing tips to force out laterals. This will make the plant bushy. When a plant grows too tall, without many laterals, severely cut it back to sound buds. A new top will then form. Use the parts removed for stem cuttings. Strong-growing varieties usually require more shortening-in than weaker-growing varieties. Most gardeners cut back bedding varieties of fibrous begonias sometime during the fall or winter months.

Winter Protection. Mulch fibrous begonias planted outside or under lath against low winter temperature with a heavy blanket of leaves, or during cold spells cover the entire plant with a double layer of burlap. Even though the growing tips are killed by frost, the covering may save the base of the plants from which new growth should push out in the spring.

Care of Tuberous Begonias

Temperature and Moisture. Not all climates are ideal for growing tuberous begonias. They are difficult to grow in very warm regions except in a lath or a muslin house, or in a well-ventilated greenhouse air-conditioned to below 90° F on hot summer days. While a temperature range of 65° to 70° F is highly favorable, very good results are possible in a range of 65° to 80° F. High temperatures tend to produce weak growth and smaller, shorter-lasting flowers. On hot days the plants will probably have to be heavily shaded. Sprinkle the walks to increase the humidity and help maintain a lower air temperature.

Soil and Fertilizer. The great variation in California soils makes it difficult to prepare outdoor beds for tuberous begonias. Plan the beds to avoid direct sunlight, yet give them sufficient light and warmth for proper plant growth.

It is important to know something about the ultimate size of the plants to space them properly in the beds. With favorable soil and climatic conditions, they will probably reach a diameter of several inches the first year. It is better to plant a little too far apart than too close. Some very serious diseases have appeared in tuberous begonias planted too close for good ventilation.

Before planting, enrich the bed with well-rotted cow manure and perhaps a little bone meal. The nitrogen from these fertilizers becomes available very slowly; it is never strong enough to injure the plants. If the soil tends to be heavy and compact or poorly drained, add leaf mold, peat, and sand.

When the seedlings come through, their growth can be improved under many soil conditions by a fertilizer containing both nitrogen and phosphorus. Half a teaspoon of ammonium phosphate placed around each plant which has reached a height of 4 to 5 inches has given very good results. Cottonseed meal worked into the soil about the plant at this stage of growth is also very satisfactory. One or two applications in the growing season will be sufficient under most soil conditions.

Potting. Pot-grown tuberous begonias need special soil and care. A mixture of 2 parts coarse leaf mold and 1 part fertile loam soil not too fine in texture is satisfactory. Before adding the soil mixture to the pot, cover the drainage hole with a broken piece of pot, then a 1-inch layer of roofing gravel. Use small pots at first, and transplant to larger pots when the plants grow too large. Plant in 6- to 8-inch pots old sprouted tubers which have already grown large root systems in the storage flats.

The size of the pot often regulates the size of the plants. In all potting work, remember to leave the soil at least 1 inch below the rim of the pot or basket to permit watering. The regulation of moisture about the roots of tuberous begonias in pots is even more important than for plants in outdoor beds, where excess moisture usually drains away better. Water only often enough to keep the surface soil slightly moist.

Hanging Baskets. Tuberous begonias growing in baskets usually require slight shade. Keep the temperature somewhere around 65° to 75° F, and provide proper and constant ventilation.

Hanging-basket varieties of tuberous begonias may have the same soil mixture used for potted plants. Either pots or baskets may be used, but moisture is more easily controlled in pots. Cover the outside of baskets with sphagnum moss. This will retain the potting mixture, yet permit good drainage. *Helxine soleioli* is sometimes used as a green cover for the outside of a basket before the moss is fastened on, but it may prevent good drainage. Do not water the hanging-basket varieties of tuberous begonias too often; keep the soil only slightly moist.

When 4 leaves have fully developed on either a basket or a pot seedling, force the plant with a light application of liquid manure given weekly. Plants not forced should thrive with a small amount of cottonseed meal or ammonium phosphate. Place a half teaspoon of either fertilizer near the edge of the pot or basket once or twice a season.

Until basket-grown tuberous begonias are well developed, remove all flower buds. Allow only 1 to 3 stems for each tuber. Encourage lateral growth by pinching out the tip of the first flower buds as they appear. It should not be necessary to prune the flowering plants heavily. Do not cut the large main stems. Fungus infections may be largely prevented by cutting only half the stem when removing the flower, and by leaving the rest of the stem to drop off naturally.

Second Blooms. When the first crop of blooms on tuberous begonias is over, a second crop may be produced by resting the plants for 2 or 3 weeks. Keep the soil somewhat dry during this period. When new shoots finally appear at the base of the old stems, cut the old stems completely back. Select 2 or 3 of the strongest shoots for the second crop of flowers and remove the rest. Stimulate the new growth by raking into the soil around each plant 1 teaspoon of ammonium phosphate and watering the plant thoroughly. Two flower crops a season should be considered sufficient in producing begonias.

Harvesting and Storing Tubers.

When the foliage of tuberous begonias begins to turn yellow, gradually stop watering. Heavy fertilizing and watering continued late into the season encourage the plants to grow into the cold season. This interferes with the early maturing of the tubers. To prevent possible spread of a *Botrytis* fungus, destroy all pieces of

the stem as they drop. As soon as the stems are removed down to the tubers, dig the tubers. Sometimes it may be necessary to dig them before they are harvested. After digging the tubers, wash off the soil and dry them for a day or two until all excess moisture has been removed. They are then ready to store in flats in a cool, dry place.

Propagation

Seeding and Seedlings. Begonia seed is very small. It must be carefully planted in specially selected and prepared soil for satisfactory germination.

Plant the seed of fibrous-rooted begonias around the first week in December under greenhouse conditions. The seeds should germinate in about 2 weeks at a temperature of 70° to 75° F. The seedlings are usually ready to transplant to flats or pots about the first or second week of January. They should be ready to transplant to outside borders or to permanent pots sometime in April. The temperature should not be lower than 65° F. Bedding varieties of begonias usually start to bloom about a month after the last transplanting.

Plant the seed of tuberous begonias from January to March. The seedlings will then be ready to transplant about 3 months later. January seedlings should begin to flower in June or July.

Seed of the rex varieties is handled in the same way.

Clean and sterilize containers for seeding. Old containers can be used if they are first sterilized, soaked in water for a day or two, and scrubbed with a steel brush. Shallow fern pans serve very well for growing small lots of seed. Small-sized seed flats may be used for larger lots.

To insure good drainage, place 2 inches of gravel in the bottom of the container. Add a 1-inch layer of potting mixture consisting of $\frac{2}{3}$ coarse leaf mold and $\frac{1}{3}$ peat moss. Smooth the surface

gently without compacting the soil, and cover with a $\frac{1}{8}$ -inch layer of the same potting mixture finely sieved. This makes a very good seedbed.

Scatter the seed carefully over the surface of the potting mixture. Do not press it in, or the soil will become too compact for good drainage. It is best to sow the seed rather thinly. This helps prevent damping-off and other troubles likely to occur if the seedlings are planted too close together.

Before planting the seed, either stand the container in water until the moisture reaches the surface, or plant the seed, then set the container in water until the moisture reaches the surface. In either method, it is very important not to dislodge the seed by overhead sprinkling.

After the seed is planted and the soil moistened, cover the container with glass and a sheet of paper, then set it away in a dark place for 2 or 3 weeks. If the location is windy, place the paper under the glass.

A night temperature of 65° to 70° F is favorable for germinating the seed of tuberous begonias and of many kinds of fibrous begonias. If the temperature falls much below 65° F, germination may be seriously retarded. Fresh seed under the most favorable conditions of temperature and moisture should produce seedlings at the end of 2 weeks. Seed not so fresh or grown under less favorable conditions may require at least 3 weeks to germinate.

As soon as the seedlings begin to break

through, remove the paper covering for more light. An even supply of overhead light will encourage the best growth. More ventilation will also be needed as the young seedlings appear. At first lift the glass or push it partly aside. If the seedlings are protected from direct sunlight in a shaded greenhouse, remove the glass after 3 or 4 days. The ventilation within the propagating house will regulate the time for removing the glass cover. There is always more or less danger of damping-off if ventilation is poor during the first 2 weeks after the seedlings appear.

The young seedlings must be kept uniformly moist. Do not let them dry out at any time. On the other hand, avoid too frequent watering. Warm the water slightly. If the seedlings show signs of damping-off, treat the surface soil as discussed in the section on diseases.

To transplant seedlings, fill the flats to a depth of 1 to 1½ inches with the same soil mixture used to germinate the seeds.

It is not necessary to use a deep layer of soil; in fact, the seedling begonias may be transplanted when they have developed their third leaf. In the first transplanting, set them about 1 inch apart. Before they become too crowded, transplant them a second time, and set them 3 or 4 inches apart.

Stem or Tip Cuttings. For rooting these cuttings, combine 10 parts coarse No. 3 or No. 4 sand with 1 part peat moss. Vermiculite and other rooting mediums may also be used. Do not try to root cuttings outside unless moisture and temperature conditions are satisfactory. Such conditions are easier to control in a propagating box or frame.

Tip cuttings of all begonias should have part of the leaf surface removed to avoid excessive loss of moisture during the rooting period (fig. 1). Cuttings of fibrous begonias may be rooted at almost any time of the year under favorable growing conditions. They will even root

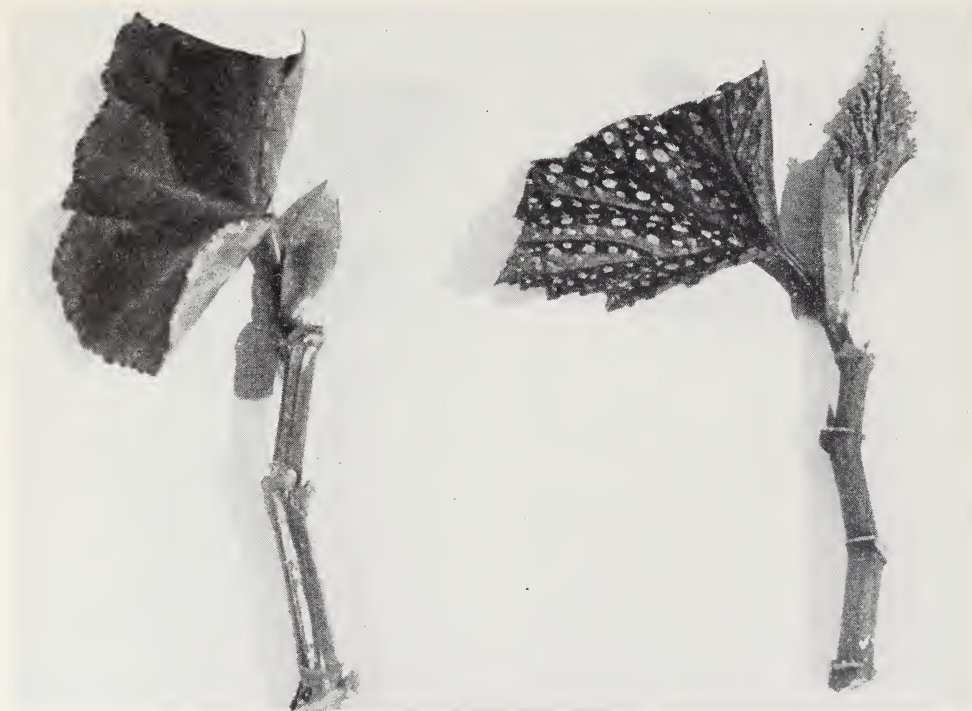


Fig. 1.—Stem cuttings of begonias prepared for rooting. These are ready to be inserted into the rooting mixture.

in water with only an inch or two of the base immersed. Bedding varieties of fibrous begonias, such as the *Begonia semperflorens* group, require a tip cutting of only 2 or 3 inches for rooting under greenhouse conditions during the winter months.

The best time to root stem cuttings, however, is from the first week of November on into January, if an electric hotbed with bottom heat (65° to 70° F) is available. If such equipment is not available, root the cuttings during the regular growing season when temperature conditions are favorable. Early rooting—preferably during the winter months—will give commercial growers a full season's growth by the following winter. This is very important if potted plants are to be sold during the Christmas season. Plants with a full year's growth will probably be somewhat more resistant to cold weather than tender young plants.

Leaf Cuttings. Many varieties of begonias valued for their foliage may be propagated by leaf cuttings in late winter or early spring. Use the same type of rooting medium used for stem or tip cuttings. The size of the leaf cutting will vary according to the kind of begonia. Cutting across a begonia leaf and inserting the edge of the cut surface in the rooting medium is not satisfactory. Some amateur growers insert the stem of a leaf in sand or water and wait for the leaf to form a new plant. It is often preferable to use a wedge-shaped or triangular piece made by cutting on either side of one of the main veins of the leaf, with the pointed end down toward the petiole (fig. 2). The pointed end is inserted in the rooting medium. With a bottom temperature of 70° F, rooting should take place within a few weeks. The new plant will rise from the base of the leaf cutting (fig. 3). Keep the humidity of the air immediately surrounding the leaf cutting fairly high until rooting has taken place.

Dividing Plants. As soon as growing conditions are favorable in the spring,

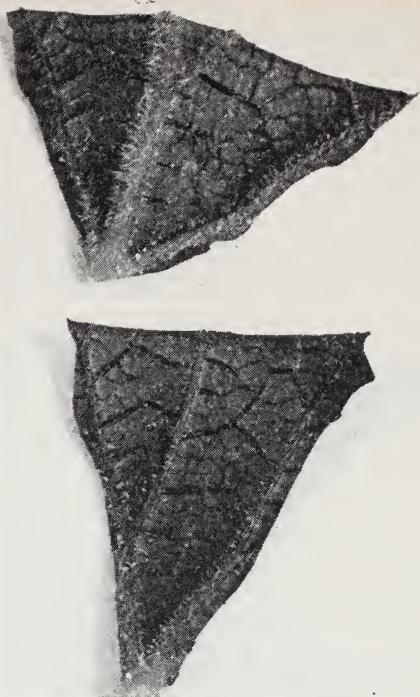


Fig. 2.—Wedge-shaped leaf cuttings ready for rooting.



Fig. 3.—Small plants developing at base of wedge-shaped cutting.

various bedding begonias may be propagated by dividing the mother plants. Separate the rooted portions of the mother plant with a sharp knife. Plant each section, with the roots attached, and carefully tend it until it is well established. One plant of bedding begonias might be divided into 3 or 4 parts. While rooted cuttings are generally more satisfactory, the division of the mother plant may work out successfully in a home garden.

Dividing Tubers. It is possible to increase tuberous begonias from January to March by dividing the tuber with a sharp knife so that at least one good bud is left with each section of the tuber. This method is limited mainly to the extremely large tubers 5 or 6 inches in diameter.

Dust the cut surface with sulfur to prevent infection. Drying the cut tubers for a few days before planting is a further precaution.

Insects and Other Pests

Aphids, Mealybugs, Thrips, and White Flies. Begonias are not often attacked by these insects. In an attack, control with highly refined oil-emulsion sprays, allowing about 2 per cent or 2½ ounces to the gallon of water. Nicotine or pyrethrum added to the summer oil increases its effectiveness.

For white fly control, spray the undersides of the leaves thoroughly. Several applications may be necessary.

Cyclamen Mites. When this mite occasionally attacks the foliage of tuberous begonias it seriously stunts their growth (fig. 4). Immersing the entire pot of begonias in warm water (110° F) for 30 minutes, or exposing it to hot vapor (110° F) for 1 hour should aid in control.

Nematodes. At times begonias are very seriously attacked by both the root-knot nematode and a leaf-infesting nematode that causes a disease sometimes called leaf spot or blight.

The root-knot nematode can best be

The best method of increasing a particularly valuable tuberous begonia is by using cuttings.

Sprouting Tubers. Tubers may be sprouted in January, February, or March in an open flat in a warm, shaded place. Many growers hold the moisture about the sprouting tubers with peat moss or sphagnum moss. As soon as the sprouts appear, plant the tubers, with the top third exposed, about 3 inches apart in flats. Cover them with peat moss only, and keep the moss barely moist to insure proper growth of the tops and roots. Prevent fungus troubles on the new growth by keeping the top of the tuber dry. This method of sprouting produces a uniform lot of tubers.

When the leaves are 3 to 4 inches in diameter, set the plants in pots or permanent beds. In outside beds, face the points of the leaves toward the front.

controlled by starting with healthy plants and clean soil. But when its presence is indicated by numerous nodules on the roots of both tuberous and fibrous varieties, immediately discard infested plants. Although this process should eliminate the nematodes, if begonias are grown outside it is extremely difficult to eradicate them completely.

Carbon disulfide has been recommended for sterilizing soils, but if the treatment is not 100 per cent effective, the remaining nematodes will increase and in time become as troublesome as their ancestors. A new product—DD—can effectively kill most of the nematodes in a new bed before planting, but the treatment must be repeated each year before planting time. The standard treatment in commercial greenhouses is to sterilize the infested soil or to treat it with a soil pasteurizer to kill all nematodes before planting time. Certain nitrogen fertilizers used as growth stimulants tend to reduce the

injurious effect of root-knot nematodes, but nothing short of clean plants and clean soil is satisfactory.

The leaf nematode is uncommon in California although it has been reported on varieties of *Begonia semperflorens* and on some tuberous and foliage begonias. The moist conditions in a greenhouse, where frequently sprinkled potted begonias touch one another, are ideal for the spread of this pest. Since no adequate treatment is known, start with healthy plants and use only soil that has been properly sterilized to kill any nematodes present. So far as possible, keep potted plants separated so that the leaves do not

touch. With these precautions, the leaf nematode should not be a problem.

If bulb and leaf nematodes become troublesome, it might be justifiable to invest in a small-capacity portable tank for treating bulbs in hot water. A tank of this type is described in popular Bulletin 184 of Washington State Agricultural Experiment Station (1947). This tank has a capacity of 150 gallons, and a treating chamber 24 inches wide, 24 inches high, and 48 inches long. It is operated with a 25-ampere fuse on a 110-volt electric line, and is reported to give very accurate control of temperature. It should be suitable for specialty growers.

Diseases

The begonia is listed as a host plant for many diseases, but the ordinary gardener and the commercial grower are interested in only a few.

Fungus Diseases and Water Molds.

These are best controlled by starting with well-drained soil not used before for growing begonias or similar plants. Avoid watering too often, especially during the period of the year when the roots are more or less inactive.

The black root rot caused by the fungus *Thielaviopsis basicola* has at times very seriously attacked the roots of seedling begonias. These begonias may also be attacked by damping-off fungi, such as species of *Rhizoctonia* and *Pythium*. To avoid such troubles, use chloropicrin (commercial larvicide) at the rate of 0.5 cc per gallon of screened soil. The soil should be moist and of good potting texture. Treat it in a closed metal container. This dosage will kill practically all plant pathogenic bacteria, fungi, and nematodes present. After treatment, allow the soil to stand outdoors for 4 days to 1 week, then air it for 1 to 2 weeks on a greenhouse bench before using it.

Various water molds at times attack begonia plants in poorly drained soil.

One is *Phytophthora* root rot, and another is *Pythium* root rot. *Pythium* has been reported on a red-flowered variety of *Begonia semperflorens*, while a pink variety growing near by was not affected.

Stem rot may be caused by either *Pythium intermedium* or *P. ultimum* (fig. 5) in plants of any size or age. These fungi are especially serious if the soil is wet and the air is moist and warm. Soft, water-soaked lesions extend lengthwise on the plant stem, and may cause it to collapse. *Begonia lloydi* is susceptible to both *Pythium* species. Control the disease by using sterile soil and sterile containers. Avoid excessive moisture, and spray with mild copper fungicides.

Botrytis cinerea produces begonia blight (fig. 6), which causes serious damage at times. The fungus infection attacks the stems and leaves of tuberous begonias grown under very humid and poorly ventilated conditions. Diseased areas on the leaves or stems enlarge rapidly and turn black, and a brownish-gray mold then appears. Gather and destroy all dead parts that fall, and remove all parts visibly affected by the fungus. Better ventilation and less humidity about the plants will help to prevent *Botrytis*. Keep the soil



(Photos on this page courtesy Division of Plant Pathology.)

Fig. 4.—Injury to tuberous begonia caused by the cyclamen mite.



Fig. 5.—*Pythium intermedium* on young tuberous begonia plant.



Fig. 6.—*Botrytis cinerea* damage to tuberous begonia in greenhouse.

moisture of newly planted begonias somewhat dry until new growth begins to push rapidly. A weak bordeaux-mixture spray or an ammoniacal copper-carbonate spray may aid in control.

Powdery mildew is not common on begonias, although it has been reported on tuberous kinds. Various commercial mildew sprays help in its control. Mildew will probably not be troublesome if the foliage is kept relatively dry.

At times several kinds of leaf spot attack begonias, but these are not important if ventilation is good and humidity is not excessive. Under greenhouse conditions, it is important to keep any moisture from dripping on the leaves.

Bacteriosis. A leaf spot of tuberous begonias has been observed in lath houses at Capitola, Colma, and San Francisco. The causal organism has been identified as a bacterium, *Xanthomonas begoniae* (*Phytoplasma flavozonatum*) (fig. 7). Varieties of the fibrous begonia *Begonia semperflorens* have also proved highly susceptible. These include Christmas Cheer, Fire Dwarf, Prima Donna, Rosabelle, Salmon Queen, and Vernon. Other varieties of fibrous begonias infected include *B. erfordi*, *B. scharffi* (*haageana*),

and *B. schmidtiana*. The tuberous varieties infected were *B. tuberhybrida*, *B. lloydi*, and *B. gracilis* var. *luminosa*. Since the disease occurs only when humidity is high and plants are crowded, reduce overhead watering and confine irrigation as much as possible to the soil about the plants.

Virus Disease. Spotted wilt (fig. 8) is a dangerous virus disease that attacks begonias. No cure is known. Certain kinds of thrips that have fed on a diseased plant carry the virus to healthy host plants.

It is easier to keep infective thrips away from healthy plants in a greenhouse than in a lath house or in an open garden. While DDT and pyrethrum sprays effectively kill thrips, sprays do not usually prevent the spread of spotted wilt. In spite of a good spray program, an infection can start by infective thrips flying in large numbers late in the summer. A more promising control is to discard all host plants known to have spotted wilt. This will prevent the thrips from becoming infective. Examine new plants carefully to be certain that they are free from spotted wilt before they are placed with healthy ones.

Selecting Begonia Names

No official rules govern the selection of horticultural names; therefore, no rules govern the choice of names for begonias. Most horticulturists agree that given names of varieties should be registered with some central organization to prevent duplication. If duplication exists, and the name is widely used, most nurserymen prefer to retain the old name and add a distinguishing term—for instance, Pres. Carnot (rex) to distinguish from the cane variety Pres. Carnot.

Occasionally a name is arbitrarily changed without the consent of the living originator. This questionable practice causes more confusion than retaining

the original name. Giving a botanical-sounding name to a horticultural variety or hybrid should be frowned upon; yet, if a botanical name already exists, retaining it will prevent the confusion of learning a new name.

A group of varieties of similar nature—as that between two species of begonias—is listed under a series name. This name often is that of one of the more popular varieties within the series, such as *semperflorens* series or Gloire de Lorraine series. More recently, attempts have been made to apply an entirely new, botanical-sounding name to such series, as *Begonia cheimantha* for the varieties in the Gloire

de Lorraine group, which includes crosses between *B. socotrana* and *B. dregei*. Similarly, the varieties resulting from a cross between *B. socotrana* and various tuberous varieties, which are known for their winter-blooming habit, have been listed under the *Hiemalis* group.

It is still debatable whether the use of such names for a hybrid group lessens the existing confusion. Many of the older begonia fanciers and nurserymen would rather list the particular kinds of crosses under the older headings than try to use an entirely new name which is not yet generally recognized or accepted.

Organizations interested in standardizing horticultural names need to establish

some sound basis for preventing future duplication. This would do more toward averting further confusion in varietal names than legislating on each case as it arises. Publicizing all general agreements would then inform individual breeders of any change in varietal names.

In the following tables, the nature of the crosses is given if definitely known. In most cases the date of discovery or introduction, which is approximately correct, is also given.

Group names mostly follow the older terms. Whenever a particular group name becomes generally recognized, however, it will be followed, regardless of what it may be.



(Photos courtesy Division of Plant Pathology.)

Fig. 7.—Left: A bacterial leaf spot on tuberous begonia. Fig. 8.—Right: spotted wilt on tuberous begonia.

Classifying Different Kinds of Begonias

In trying to classify or group different kinds of begonias, certain outstanding characteristics of stems, leaves, and flowers are considered. Unfortunately, popular classifications often fail to indicate the important differences known to most fanciers, but they do give growers a better acquaintance with begonias now grown.

Cane-stemmed Fibrous. There are three types of cane-stemmed begonias: tall or tree, medium height, and low growing. *Lucerna* is a popular tall or tree type of cane-stemmed begonia (fig. 9). The tall tree type reaches a height of 10 feet or more. *Argenteo-guttata*, the medium-height type, is more spreading (fig. 10). *Begonia olbia* represents the low-growing type. Cane-stemmed begonias in general have smooth leaves of various shapes. Table 1 lists this class.

Fig. 9.—Right: *Lucerna* (*corallina Lucerna*), perhaps the most common of the tall cane varieties. Fig. 10.—Below: *Argenteo-guttata*, a very popular spreading cane variety.



Table 1—CANE-STEMMED FIBROUS CLASS

Name	Origin	Characteristics			Remarks
		Plant	Leaves	Flowers	
Tall or Tree Varieties					
B. coccinea (B. rubra)	Brazil, 1774; to Europe, 1841	Several feet tall; smooth erect stems	Long ovate; bright green or reddish at margins	Profuse drooping clusters; coral red	Parent of several varieties
B. corallina	Brazil to Europe, 1875				Resembles B. coccinea somewhat
B. maculata	Brazil, 1819	2-5' tall	Silver spotted	Large, pendulous; pink	Contributes silver spotting to some hybrids
Lucerna (see fig. 9)	Derived from B. corallina; distributed about 1903	10' or more tall; vigorous; stout erect branches	Large; broad; angular; olive green with silver spots, red beneath	Large pendent clusters; pink to red; starts flowering when fairly young	Very popular
Nightingale (fig. 11)	Calif.; developed before 1938 by Mrs. Eva Gray		Ruffled margins		Resembles Lucerna except for margins
Pres. Carnot (cane) (B. corallina × B. olbia)	France, 1890	Tall; vigorous	Ovate pointed; slightly lobed; toothed; crinkled; green; young shoots sometimes spotted; red tinged	Large trusses; carmine colored	One of the best of this variety
Medium-height Varieties					
Argenteo-guttata (B. albo-picta × B. olbia) (see fig. 10)	Hybrid produced by Lemoine, France, 1888	Shrubby; spreading	Med. sized; ovate pointed; shallow lobed; distinct silver spots on top, red beneath	Creamy white; tinged pink at times	Dependable variety; easy to grow

Continued next page

Table 1—CANE-STEMMED FIBROUS CLASS (continued)

Name	Origin	Characteristics			Remarks
		Plant	Leaves	Flowers	
Medium-height Varieties—Continued					
B. incarnata (fig. 12)	Mexico to Europe, 1822	1' or more tall; bushy; stems erect and branched	Pointed ovate; to 4" long and 2" wide; toothed margins; light green	Borne in leaf axils and at terminals; pink	Form with slightly larger leaves developed in California
B. nitida	Jamaica to England, 1777	About 2' tall; upright	Slightly cupped; glossy green	Numerous; white	Must not be confused with <i>Odorata rosea</i> , which is taller
Catalina (Improved digswelliana) (B. odorata × B. fuchsioides)	Grown by Mrs. Theodosia B. Shepherd, Ventura, before 1906	Low; spreading	Rather small; toothed, with undulate margins; dark green; petioles bright red	Large, pinkish; grow in leaf axils	
Deckers Select	Unknown; first sold by Deckers' Nursery, Los Angeles	Upright; bushy; smooth	Obliquely pointed; sometimes margins reddish	Pink	
Digswelliana (Odorata × B. fuchsioides)	England, 1865	Bushy; drooping branches	Small; fleshy, elliptic ovate; coarsely toothed; light green	Small; similar to B. fuchsioides	
Ingrami (robusta) (B. nitida × B. fuchsioides)	England, about 1847	Bushy	Small, long ovate; toothed; glossy bronze	Short clusters; deep pink	
Odorata alba	Sold in Calif. in 1874	Large; spreading	Round; glossy	Large clusters; white	Resembles B. nitida rosea, but considered distinct by T. H. Everett, N. Y. Bot. Gardens
Preussen	German variety; date unknown	Branching; sturdy; erect stems	Ovate pointed; toothed; olive green, faintly spotted with silver when young	Abundant; few florets in cluster; blooms long; pink	

<i>B. dichroa</i>	Brazil to Germany, 1906	Woody; low; spreading	Obliquely ovate; pointed; glossy green, sometimes silver spotted	Large orange clusters close to stem	Needs plenty of heat
<i>B. foliosa</i>	Colombia to England, 1868; used for hanging baskets	Bushy	Fernlike; ovate; toothed; deep green	White or tinged with pink on threadlike pedicels	
<i>B. olbia</i>	From Brazil, 1883	Low; bushy	Ovate; lobed; toothed; bronzy green with dark veins; red beneath	Drooping; white	One parent of Argenteo-guttata and Pres. Carnot (cane); sometimes hard to grow
<i>Glaucophylla</i> (Lim-minghei)	Belgium, 1865	Slender; trailing	Wedge shaped; wavy margins; glossy gray green	Coral red; unimportant	Good basket variety; <i>B. coccinea</i> may be one parent
Marjorie Daw (<i>B. coccinea</i> X <i>Glaucophylla</i>)	Dev. by Mrs. Theodosia B. Shepherd in 1880's	Climber, needing trellis	Triangular ovate; bright green	Large trusses; pink	To 15' on supports

Hirsute or Hairy. Hairy leaves and stems (hirsute character) have given the name hirsute to this class of begonias. The class includes varieties of different habits of growth and different leaf forms, but does not include begonias with rhizomes, although some rhizomatous kinds do have hairy leaf stems. Table 2 groups varieties with similar leaves, and calls attention to important characteristics.

Rhizomatous or Creeping Stem (Except Rex-Cultorum). This group is in contrast to the upright caned-stem varieties. Rhizomatous stems are found on rex begonias and on some smooth-leaved fibrous begonias. A further subdivision indicates the form and size of leaf and whether the rhizomatous stems of certain rex begonias branch or not. There are also miniature or dwarf forms of rex begonias whose small leaves are grouped separately. All of these groups have fibrous roots.

Within the general group are three distinct types of leaves: plain, star, and spiraled or crested forms that may have originated from the plain-leaved varieties first listed in this class. The star type includes a group with variable leaves on the same plant, but the leaves of most groups are uniformly palmate with deeply incised lobes that give the name star begonia. There are two distinct forms, one of the *Begonia ricinifolia* (fig. 16, p. 21) and Sunderbruchi type, the other represented by such varieties as Silver Star, Carol Star, Mrs. Mary Peace, and Green Star (fig. 17, p. 22). *B. caroliniaefolia* is a parent in the second group, while *B. ricinifolia* seems to be a dominant parent in the first group.

In the spiraled and crested types, one, called helix, has spiraled leaves with basal leaf lobes twisting around like a snail. Another type has crested margins. The curly or frilled growth distinguishes it from the spiraled type.

Table 3, page 23, lists some of the varieties of these three types.

Fig. 11.—Right: Nightingale, a California cane variety similar to Lucerna except for the ruffled leaf margins.

Fig. 12.—Below, left: *Begonia incarnata*, an improved form with larger leaves.

Fig. 13.—Below, right: *Begonia acutangula*, a variety of *B. angularis*, developed about 1935 and prized for its excellent leaves and vigorous growth.





Fig. 14.—*Begonia luxurians*, a species with palmlike, compound leaves, gives a tropical effect in the lathhouse.



Fig. 15.—*Begonia Scharffi* (*B. haageana*), one of the most popular species in the hirsute group.

Table 2—HIRSUTE OR HAIRY CLASS

Name	Origin	Characteristics			Remarks
		Plant	Leaves	Flowers	
<i>B. angularis</i> (B. zebrina)	Brazil, 1822	3' or more tall; branches drooping or spreading	Leaves long ovate; pointed; toothed; wavy margins	Arching terminal clusters; small; white	
<i>B. acutangula</i> (fig. 13)	Calif., about 1935	Large; stout; erect	Large; coarsely toothed; rounded tips; green, sometimes red beneath	White	Variety of <i>B. angularis</i> , but larger, stouter, more erect
Mrs. W. A. Wallow	Calif., 1928; originated by W. A. Wallow, Long Beach	3' or more tall; rather bushy; sparingly branched	Pointed; coarsely toothed; wavy at margins; olive green, bright red beneath; only slightly hairy	Light colored; erect clusters	Chance seedling; same type leaf as <i>B. acutangula</i>
<i>B. luxurians</i> (fig. 14)	Brazil, 1846	6' or more tall in old age; sparsely hairy	Palmately compound of up to 16 narrow, green, toothed leaflets	Small; white; unimportant	Palmlike appearance different from most begonias
Mrs. Fred Scripps	San Diego, 1935	5' or more tall; vigorous; bushy; stout stemmed	5-7 lobed; basal lobe sometimes forms separate leaflet; olive green, red beneath	Pink; small; held on long arching stems	Looks tropical
<i>B. metallica</i>	Brazil, 1869	2' or more tall; bushy; hairy; erect	Metallic colored; purple veins above; red beneath	Light pink; large clusters; showy	
Nelly Bly	Calif., 1923; dev. by Mrs. Eva Gray	Bushy	Pointed; coarsely toothed; very dark green, red beneath	Pink tinted	Related variety believed seedling of <i>B. cyprea</i> with <i>B. metallica</i> as other parent

B. sanguinea	Brazil, before 1820	Red stems; loosely branched; rise from base	Olive green, scarlet beneath	Small; white	Leaf characteristics carried over to some of hybrids
Braemer	Calif., 1937	Very hairy stems; stout; angled; loose, spreading habit		Large; white	Chance seedling; red color makes it almost rubra
Thurstoni (B. metallica X B. sanguinea)	New Jersey, 1887	2' tall; bushy; almost smooth stems	Ovate pointed; smooth, shiny; bronzy green, red beneath	Pink; clusters erect	Leaves somewhat similar to B. sanguinea; long a popular variety
B. scharffiana	Brazil	White-haired stems; robust	Broad ovate; pointed to 8" long; olive green above, red beneath	Waxy white; borne in long-peduncled clusters; red hairs	Excellent pot plant; species supposed to be a parent of Mrs. Fred Scripps of B. luxurians group
B. scharffi (fig. 15)	Brazil	Hirsute, but not such hairy effect	Large; ovate pointed; shallow lobed to 10" long; white haired; olive green above, red beneath	Large; pale pink on long stems	Often known as B. haagiana; a favorite foliage begonia for pot culture



Fig. 16.—*Begonia ricinifolia*, rhizomatous (a cross of *B. heracleifolia* and *B. peponifolia*), originated in England in 1847.



Fig. 17.—Green Star, with star-shaped, green leaves blotched with silver. Fig. 18.—Bunchi, prized for its ruffled and crested leaf margins.



Fig. 19.—Erythrophylla, a rhizomatous, German variety, renamed Feasti when introduced into America about 1880.

Table 3—RHIZOMATOUS OR CREEPING-STEM CLASS
(Except *Rex-Cultorum*)

Name	Origin	Characteristics			Remarks
		Plant	Leaves	Flowers	
Plain-leaved Varieties					
B. manicata	Mexico to Belgium, 1837; sold in Calif., 1858		Ovate; fleshy; smooth; green with toothed margins and collar of red hairs top each leaf stalk	Drooping; pink	
B. manicata aureo-maculata	Introd. by Lemoine, 1884		Blotched; yellow		Crested form listed in helix and crested group
Erythrophylla (Feasti) (B. manicata X B. hydrocotylifolia) (fig. 19)	Berlin, 1849; re-named after Dr. Feast who brought it to America about 1880	Often pendent with age	Orbicular on short petioles; fleshy; glossy; dark green, bright red beneath		
Verschafelti (B. manicata X B. caroliniaefolia)	Switzerland, 1853	Large rhizomes	Roundish; glossy; bright green	Tall drooping panicles; bright pink	Old, popular variety
Star Varieties					
B. heracleifolia	Mexico, 1830		Large; palmate; leaf stems covered with thick hairs		Used to produce Rincinifolia and Sunderbruchi
B. heracleifolia var. nigricans	Mexico, 1844		Long petioles; to 1' wide; variegated light and dark green; 7-9 fingerlike lobes	Tall panicles; white	Resembles Sunderbruchi in habit and form; good foliage begonia

Continued next page

Table 3—RHIZOMATOUS OR CREEPING-STEM CLASS (continued)

Name	Origin	Characteristics			Remarks
		Plant	Leaves	Flowers	
Star Varieties—Continued					
Ricinifolia (see fig. 16) (B. heracleifolia × B. peponifolia)	England, 1847		Leaves resemble castor bean; hairy leaf stems extend out 1-1½'; large, pointedly lobed to ⅔ depth		
Sunderbruchi (Ricinifolia × B. heracleifolia)	Calif., 1895		Blend of dark green, emerald, and bronzy green; up to 7 fingerlike lobes		Resembles B. heracleifolia more than Ricinifolia
Marian	Grown by A. D. Robinson many years ago	Tall stems	Bronzy green; reddish beneath	Rose pink	Seedling of Ricinifolia; excellent pot plant for large rooms and conservatories
B. caroliniaefolia	Mexico to Europe, 1852	Rhizomes thick, nearly erect; only rarely branched	Palmate; fleshy; 6-8 toothed leaflets	Arching flower stems; clear pink	Leaves doubtless account for star-shaped leaves in derivatives
Carol Star (B. caroliniaefolia × Sunderbruchi)	Oregon, 1941; dev. by Leslie Woodruff		Large, ovate, shallow lobed; toothed; fleshy; glossy green	Large; pale pink to deep rose	
Green Star (B. caroliniaefolia × B. liebmanni) (see fig. 17)	Calif., 1945; dev. by Mrs. Elsie Frey				Similar to Silver Star, except for greener leaves

Mrs. Mary Peace	Calif., 1920; dev. by Mrs. Mary Peace		Deeply incised; 6-8 leaflets not entirely separated down to petiole as in species; dark green; margins wavy and coarsely toothed; red beneath	Slender, arching flower stems; loose clusters; pink	Chance seedling resembling <i>B. caroliniaefolia</i>
Silver Star (<i>B. caroliniaefolia</i> × <i>B. liebmanni</i>)	Calif., dev. by Mrs. Elsie Frey				
Spiraled and Crested Varieties					
<i>B. manicata crispa</i>			Crested leaf margins		Also crispate form of <i>B. manicata aureo-maculata</i> called <i>crispa</i> ; varieties resemble parents except for odd leaf formation
Bunchi (fig. 18)	Kansas		Ruffled; crested or frilled at margin		Variety of <i>Erythrophylla</i> (Feastl)
Crestibruchi (<i>B. manicata crispa</i> × <i>Sunderbruchi</i>)	Calif., 1938; dev. at Lewis Begonia Gardens		Unusually ruffled; margins heavily frilled or crested		Outstanding in this type of leaf
<i>Erythrophylla helix</i> (Feastl <i>helix</i>)			Spiraled; ruffled margins		See also spiraled leaf form of <i>rex</i> begonias (p. 30)

Table 4—REX CLASS (RHIZOMATOUS)

Name	Origin	Characteristics		Remarks
		Plant	Leaves	
Large-leaved Varieties				
Lesoudsi (see fig. 21)	France, 1885		Maplelike; dusky green, irregularly spotted; zoned with pea green	Large pink flowers
Magnifica (King of Rex, Eminent)	U. S., 1892		Immense olive green, with zone of yellow green	
Pres. Carnot (rex) (see fig. 20)			Large, olive green; blotched with silver	Not to be confused with cane-stemmed variety Pres. Carnot; attempts to rename unsuccessful
Rajah (Ranee)			Large, elongated, with lustrous black center overcast with purple; zone of yellow green, overcast with daphne pink, shades out from center; spots mottle center and border	
Silver Cloud	Calif.; orig. by Mrs. Theodosia B. Shepherd, Ventura		Gray-green field at center; edge veined dull greenish black; burnt lake beneath	Similar to Clementina
Medium-leaved Varieties				
Fireflush (Bettina Rothschild)	France, 1866		Heart shaped; olive green with lighter olive-green band; crimson red hairs on young leaves	

Louise Closson	Introd., 1889			Center and border of leaves dusky brown; irregular zone of raised daphne-red blotches	Distinctive red variety
Mary Louise				Ovate; 5-7 lobed; silvered, with olive-green center; bright green margins silver spotted and ruffled; pinkish purple cast over surface	
Mountain Haze	American variety			Pea green shading darker at center and edges; suffused with purple	Thrives in humid greenhouse; hard to grow outside
Mulberry	Calif., dev. by Roy Berry			Green, finely dotted with light green; overcast of mulberry red	
Queen of Hanover			Stems covered with pink hairs	Round, rough at center, with dark olive-green zone and pea-green edge; covered with pink hairs	Similar to B. griffithi
Miniature or Small-leaved Varieties					
Baby Rainbow				Silver spotted on green with purplish center and other colors mingling in rainbow effect	True miniature rex
Helix or Spiraled Varieties					
Bronze King	1931			Very ruffled, spiraled lobes; center and narrow edge olive brown or bronze; main field green with faint spots	
Comtesse Louise Erdoedy (Erdody) (see fig. 22)	Hungary, 1883			To 1' long; ovate; one or both basal lobes curled; pea green flushed with purple	First of spiraled leaf forms; best known of type

Table 4—REX CLASS (RHIZOMATOUS) (continued)

Name	Origin	Characteristics		Remarks
		Plant	Leaves	
Helix or Spiraled Varieties—Continued				
Count Adrien Erdoedy			Small, palmate; spiraled with palmate greenish-olive center; main body white fretted pattern on edge of emerald green shading to greenish olive	
Princess of Hanover			Both lobes spiraled; hairy, with olive-black center, and zone of pea green edged with ivy green	Considered a spiraled form of Queen of Hanover
Branching or Discolor Varieties				
Adrien Schmitt	French variety introd. U. S., 1888		Pointed, olive-black center edging to dark green; blotched with silver between veins; overcast with red; tips splashed silver	
Mrs. H. G. Moon			Palmate center silvery green stippled green; overcast with light violet	Makes good clump
Van-Ex	Dev. by Roy Berry, 1931	Many branches	Pointed, serrated; dark-green centers and silver zone, spotted silver; also bordered with lighter green, overlaid with wine red	Cross between a rex variety and B. evansiana; fine specimen of variety

Rex (Rhizomatous). The rex begonias of today are hybrids of the original *Begonia rex*, and are widely listed under *B. rex-cultorum*. Varieties differ in size of leaf and plant, in color pattern of the leaf, and in formation of the leaf, as in the spiraled or helix type.

One group has leaves with outstanding silver spots, such as Pres. Carnot (rex) (fig. 20). Another group has plushlike soft hairs on the young leaves, and rather obscure color bands in different shades of green. Fireflush (Bettina Rothschild is listed as the original name) and Queen of Hanover are specimens of this group. Another group of rex varieties has rather distinct color bands closely following the contour of the shallowly lobed leaves.

Lesoudsi (fig. 21) is representative of this group. The spiraled or helix shape is represented by Comtesse Louise Erdody (Erdody) (fig. 22). Branching of the rhizomes occurred in hybrids *Begonia rex* and *B. evansiana*. This group is known as the branching or discolor type. Abel Carriere, introduced to the trade in France in 1876, was one of the first of this type.

The miniature or small-leaved rex varieties have caused considerable confusion when listed. Illustrata and It have at times been erroneously listed under this heading. Several true miniature rex varieties will become available shortly.

Table 4 lists some of the varieties under this classification.



Fig. 20.—President Carnot (rex), an old, popular variety with large leaves that are blotched with raised silver spots.

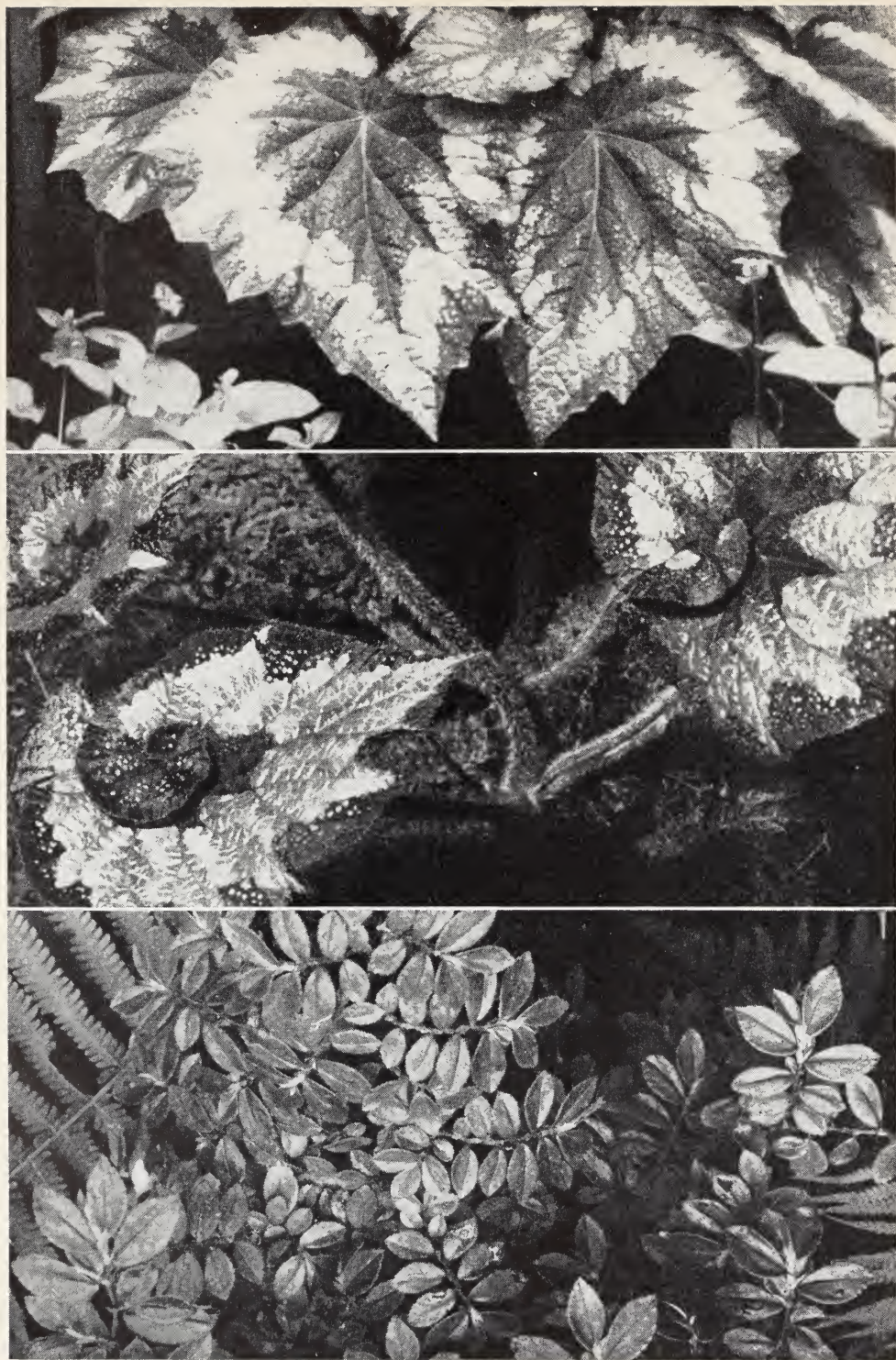


Fig. 21.—Top: Lesoudsi, a French rex begonia introduced in 1885. Fig. 22.—Center: Comtesse Louise Erdoedy, a spiral-leaved form of rex begonia. Fig. 23.—Bottom: *Begonia fuchsioides* has very small, two-ranked leaves. Makes an ornamental spray, and has been used as a hedge plant.

Bedding and Florist. Bedding begonias include the small, low-growing, many-flowered kinds. This group has been developed largely from *Begonia semperflorens* or from hybrids between this and other species, such as *B. fuchsoides* (fig. 23), *B. roezli*, and *B. schmidtiana*. The name *semperflorens* series came into common use for this particular group, regardless of the exact parentage, through the importance of *B. semperflorens* in early breeding. More recently growers have suggested lumping this hybrid group under *B. semperflorens-cultorum*, similar to the grouping under *B. rex-cultorum*. The choice of name seems immaterial as long as growers are generally agreed to it.

The Gloire de Lorraine series was produced by Lemoine in France in 1891 by crossing *Begonia socotrana*, a bulbous species from Socotra in the Indian Ocean, with *B. dregei*, a semibulbous species. The winter-flowering habit imparted by *B. dregei* accounts for its popularity. Most of the varieties are grown as potted plants, and are more appropriately associated with florist varieties than with tuberous varieties. Their winter-blooming habit has given them the name of winter begonias. The varieties of the Gloire de Lorraine series cannot be used for bedding. They are florist begonias only.

Another group of hybrids may be associated with the same group or series—namely, crosses between *B. socotrana* and other species or varieties, such as *B. incarnata*. The hybrid varieties are winter blooming, have large flowers, pleasing in color.

Table 5 lists certain varieties of these groups.



Fig. 24.—Top: Gloire de Chatelaine, a fibrous-rooted begonia of the *semperflorens* group.

Fig. 25.—Center: Calla begonia, a variegated form of the Vernon group of bedding types.

Fig. 26.—Bottom: *Begonia Richardsoni*, a semi-tuberous species valued for its small, maplelike leaves, pinkish-white flowers, and bushy growth.

Table 5—BEDDING AND FLORIST CLASS

Name	Origin	Characteristics			Remarks
		Plant	Leaves	Flowers	
Semperflorens (B. Semperflorens-cultorum) Series					
Carrierei	From France, 1881	1' tall; compact		Pure white	Hybrid of B. semperflorens X B. schmidtiana; excellent bedding variety
Christmas Cheer	1936		Green	Cherry red	
Corbeille de Feu (Bertha de Chateau-Rocher, Ascotiensis)	France, Lemoine, 1891	Branch freely at base		Coral red; profuse; long season	Hybrid of B. semperflorens X B. fuchsoides miniata; stands sun very well; excellent for bedding purposes
Erfordi	From Germany, 1893			Rose carmine; profuse	Cross between Vernon X B. schmidtiana; popular for bedding purposes
Gloire de Chatelaine (fig. 24)	From France, 1907	Dwarf; compact		Numerous; light pink	Popular bedding and pot plant for florist sale
Mrs. M. A. Patten				Deep pink	Sport of Gloire de Chatelaine
Geneva Rose Beauty	1936			Rose	Variety of Geneva Scarlet Beauty

Geneva Scarlet Beauty	Gustav Lind cross, 1936	Large		Scarlet, pompon shaped	Larger than parent
Geneva White Beauty	1936				Variety of Geneva Scarlet Beauty
Gustav Lind (West-port Beauty)	From Sweden, 1934	Small, compact	Bright green	Double, pink	Product of semperflorens group and B. fuchsoides var. floribunda
Mrs. Margaret E. Ham	1936		Bronzy red	Scarlet	
Rosea-gigantea	Introd. by Lemoine, France, 1883	To 3' tall; woody rootstock; succulent stems		Yellow stamens; deep red flowers	Suitable for pots and for winter decoration; not good for bedding
Triomphe de Lorraine	Introd. by Lemoine, France, 1887		Small, bronze red	Golden stamens; cherry-red flowers	
Vernon (fig. 25)	France, 1890		Bronze	Scarlet trusses	Calla begonia probably variegated form
Gloire de Lorraine Series (B. cheimanthia)					
Gloire de Lorraine (B. socotrana × B. dregelii)	Lemoine, 1891			Showy pink; loose clusters	
Glory of Cincinnati (B. socotrana × Lonsdale)	Orig. by J. A. Peterson, Cincinnati, Ohio			Pink	Holds flowers very well
Lady Mac (Gloire de Lorraine × Gloire de Lorraine)	Orig. by W. W. Edgar, Watertown, Mass., 1925			Pink	One of best in series

Continued next page

Table 5—BEDDING AND FLORIST CLASS (continued)

Name	Origin	Characteristics			Remarks
		Plant	Leaves	Flowers	
Gloire de Lorraine Series (<i>B. cheinantha</i>)—Continued					
Lonsdale (Pink)				Numerous; pink	Old variety, not so good as Glory of Cincinnati
Lucille	Dev. by Harold Raver, Connecticut			Numerous; bright red	Probably chance seedling
Marjorie Gibbs	Dev. by Clarence Gibbs, Lynn, Mass., 1918			Large; pink	Not such clear pink as Lady Mac
Melior (<i>B. socotrana</i> × Lonsdale)	Orig. by J. A. Peterson, 1914			Soft pink	Same parentage as Glory of Cincinnati; soft pink often listed
Other Varieties of Similar Nature					
Gloire de Sceaux (<i>B. socotrana</i> × <i>B. incarnata</i> var. <i>purpurea</i>)	France, 1884		Bronzy red	Vivid	Used as one parent of Mrs. J. A. Peterson; other varieties in same group: Autumn Rose, Elatior, and Ensign
Mrs. J. A. Peterson (Gloire de Lorraine × Gloire de Sceaux)	Orig. by J. A. Peterson, 1915		Bronzy red	Bright pink	

Table 6—SEMITUBEROUS CLASS

Name	Origin	Characteristics			Remarks
		Plant	Leaves	Flowers	
<i>B. dregei</i>	Africa, 1836	Medium tall ; branched stems	Small ; maplelike ; green, with purple veins	White ; borne in ter- minal clusters	
<i>B. richardsoni</i> (fig. 26)	Africa, 1871	Smaller than <i>B.</i> <i>dregei</i>	Finely lobed	Pink to white	Makes fine pot plant for limited space
<i>Weltoniensis</i> (<i>B.</i> <i>sutherlandi</i> × <i>B.</i> <i>dregei</i>)	England, 1868 ; to California by 1874	Smooth stems ; bushy growth	Small, maplelike	Both white and pink forms listed	Dormant in winter, but good pot plant for rest of year

Semituberous. A few kinds of begonias with swellings at the base of the stems are classified as semituberous. They may have slender stems, similar to the cane-stemmed class, but are justifiably placed in a separate group by their bushy habit of growth and the swellings at the base of the stems. These begonias, listed in table 6, are valued mostly as foliage plants.

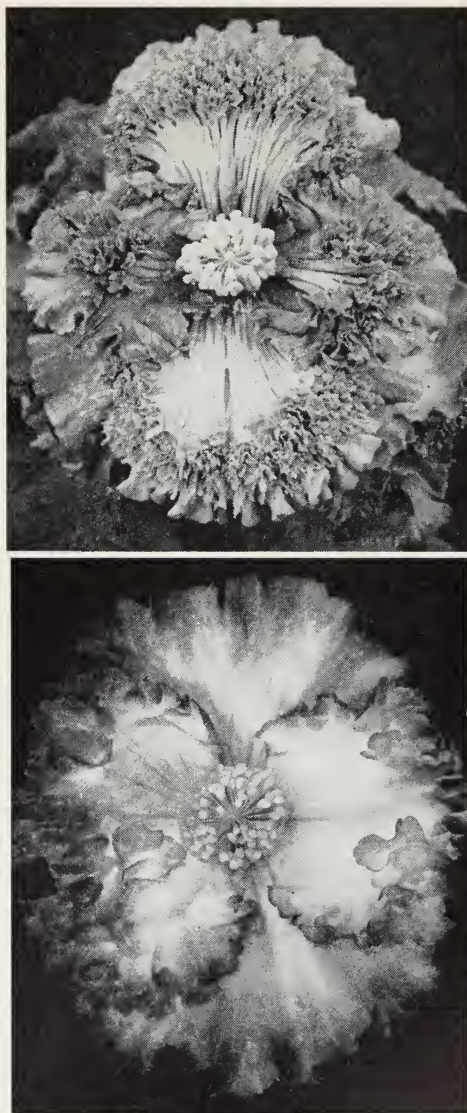


Fig. 27.—Top: Single tuberous begonia, cristata, or crested, type. Fig. 28.—Bottom: The frilled, or crisa, type of single tuberous begonia.

Table 7—TUBEROUS CLASS

Name	Origin	Characteristics			Remarks
		Plant	Leaves	Flowers	
<i>B. baumani</i>	Bolivia, 1886; distr. by Lemoine, 1890	Large		Rose red	Used to produce narcissus-flowered type
<i>B. boliviensis</i>	Bolivia, 1857; introduced U. S. 1865			Fuchsia-like; scarlet	Gave rise to <i>B. Lloydi</i> , horticultural group of trailing varieties for pots and hanging baskets
<i>B. davisi</i> (Davis begonia)	Peru, 1876			Free-flowering habit; bright red	
<i>B. evansiana</i>	Java, China, Japan; introduced U. S., 1804	Branching stems		Small; pink; in showers	Outdoor variety; propagated by auxiliary bulbets
<i>B. froebeli</i>	From Ecuador, 1874; available in California			Large; bright scarlet; tall, branching clusters	
<i>B. fulgens</i>	From Bolivia, and introduced by Lemoine about 1893	Low growing		Red flowers	
<i>B. martiana</i> (holly-hock begonia)	Disc. Mexico, 1829; now listed by some Calif. nurserymen	3-5' tall		Mallow pink; borne in axils of leaves; appears for 2-3 months in summer	Plants often used as background for dwarf varieties; winter holly-hock (<i>B. martiana</i> × <i>B. socotrana</i>) shorter than species (<i>Woodruff</i> , 1941)

B. pearcei (Pearce begonia)	From Bolivia, 1865; available in California		Mottled, velvety green		Fine for beds and borders; species accounts for yellow in many hybrids
B. rosaeiflora	From Peru, 1867; probably not available in Calif.				Mentioned because may account for white in some modern tuberous begonias
B. veitchii	From Peru, 1867				Mentioned because of cinnamon red imparted to its hybrids

Tuberous. Plants in this group have distinct tubers which can be used for propagation. Seedlings or rooted cuttings immediately form tubers at the base, and these live over from one season to the next.

Varieties are classified according to the shape of the flower and the habit of the plant. In the hanging-basket type, varieties of *Begonia lloydi* (see *B. bolivien-sis*, table 7) sometimes referred to as *B. pendula*, are frequently grown in hanging baskets, but the rest of the tuberous begonias, including both single and double forms, are more or less upright in habit of growth. Their flowers may be single or double, and a few hybrids are winter bloomers.

The single varieties are available in several forms: plain single without frills or crests; crested single (fig. 27), often referred to as the *cristata* type, with a crested growth on each of the four petals; frilled single, referred to as the *crispa* type (fig. 28), with edges of the petals more or less deeply frilled (dealers sometimes refer to this type as *crispa margi-nata*); and *narcissiflora* type, very closely resembling the trumpet daffodils in shape of flowers (fig. 29).

The common double varieties include several forms: double rosebud type, with flowers having rosebud centers; double camellia or *camelliae florum* type (fig. 30), usually considered the most popular of the double tuberous begonias (in recent years the size of its flowers has been increased greatly, and one strain has petals with ruffled margins (cover); carnation or *fimbriata* type with deeply serrated petals, giving a frilled effect. This type may be considered a double form of the *crispa* type (fig. 31).

In the dwarf multiflora class, the *multi-flora nana* group of hybrid tuberous begonias has recently received renewed interest, but should not be confused with the fibrous *Begonia multiflora* species, which has much smaller flowers. The plants have a dwarfed, bushy habit of



Fig. 29.—Top: The narcissiflora type of tuberous begonia. Fig. 30.—Center: Camellia-flowered type of tuberous begonia, full to the center. Fig. 31.—Bottom: Fimbriata plena, or carnation type, double-flowered tuberous begonia.

Fig. 32—*Socotrana* hybrid, or winter-flowering tuberous begonia, is listed occasionally by dealers, but will probably not be popular because plants are not easily produced from seeds, so must be grown from cuttings.



Fig. 33.—*Begonia acida*, a rhizomatous species with a spreading habit of growth.

growth. All summer they are covered with small flowers, either double or single, of good colors, and ranging in size from 1½ to 3 inches in diameter. They are suitable for border and bedding purposes and make good potted plants. Since seed from the plants does not come true to type or color, the only dependable methods of propagation which will keep the plants true to the parent are cuttings or division.

The winter-flowering *Begonia socotrana* hybrids (fig. 32) are produced by cross-

ing *B. socotrana* with the large tuberous begonias. They are receiving some interest, primarily for their winter flowers. Further work in breeding may improve the size of the flowers and produce other desirable characteristics. The tubers are not likely to be so cheap as other tuberous begonia varieties, since plants cannot be produced easily from seed and must be grown from cuttings which form tubers during the second year.

Table 7 shows some tuberous species.

Table 8—RARE OR ODD VARIETIES

Name	Origin	Characteristics			Remarks
		Plant	Leaves	Flowers	
<i>B. acida</i> (fig. 33)	Brazil, 1943		Rugose	White; drooping	Uncommon species; thrives in ordinary humid heated greenhouse with ferns and anthuriums; somewhat dormant in winter
<i>B. deliciosa</i>	Probably from Borneo to Europe 1880 with <i>B. diadema</i>		Deeply lobed; silver spotted; red beneath	Large; soft pink	Not so deeply lobed as <i>B. diadema</i>
<i>B. diadema</i>	From Borneo, 1880	About 2' tall	Deeply parted; maple-like; dentate and green; silver spotted	White; unimportant	Considered difficult to grow
<i>B. incana</i> (<i>B. peltata</i>)	Mexico, 1838		Peltate; white scurfy		Tolerates more adverse conditions than most common begonias
<i>B. kellermani</i>	Guatemala, 1919		Deeply cupped; small, round		Resembles <i>B. incana</i> , except leaves smaller, rounder

B. luxurians (see fig. 14, p. 19)	Brazil, 1846	Deeply cut, incised; held erect like an umbrella; each leaf section narrow; at center small ruffle of auxiliary leaves	Looks tropical
B. sceptrum (Diadema erecta)	From Brazil, 1883	Cut; white spotted	Resembles Palmata more than B. diadema, except for leaves
B. venosa	Brazil, 1898	Papery stipules base of leaves clasp stem; leaves white scurfy, like peltata, but not peltate in shape	Still uncommon

Rare or Odd. Table 8 lists certain odd leaf or stem forms of begonias. Some of these are also rare. Although varieties with scurfy leaves, papery stipules, very deeply cut palmate or star-shaped leaves could also be included here, they appear in the preceding tables. Not all of the varieties listed are available at some retail nurseries, but the names are given as a source of reference for interested fanciers.

References

BROWN, WORTH

1948. Tuberous begonias. (128 p.) M. Barrows & Company, Inc., 114 E. 32d Street, New York 16.

BUXTON, B. R.

1946. Begonias and how to grow them. (163 p.) Oxford University Press, 114 Fifth Avenue, New York 11, N.Y.

KRAUSS, H. K.

1947. Begonias for American homes and gardens. (228 p.) The Macmillan Company, New York, N.Y.

LANGDON, ALLAN G.

1949. Tuberous begonias. Mendip Press, Ltd. (Bath, England.)

OTTEN, G.

1935. Tuberous-rooted begonias and their culture. (84 p.) A. T. De La Mare Company, Inc., New York, N.Y.

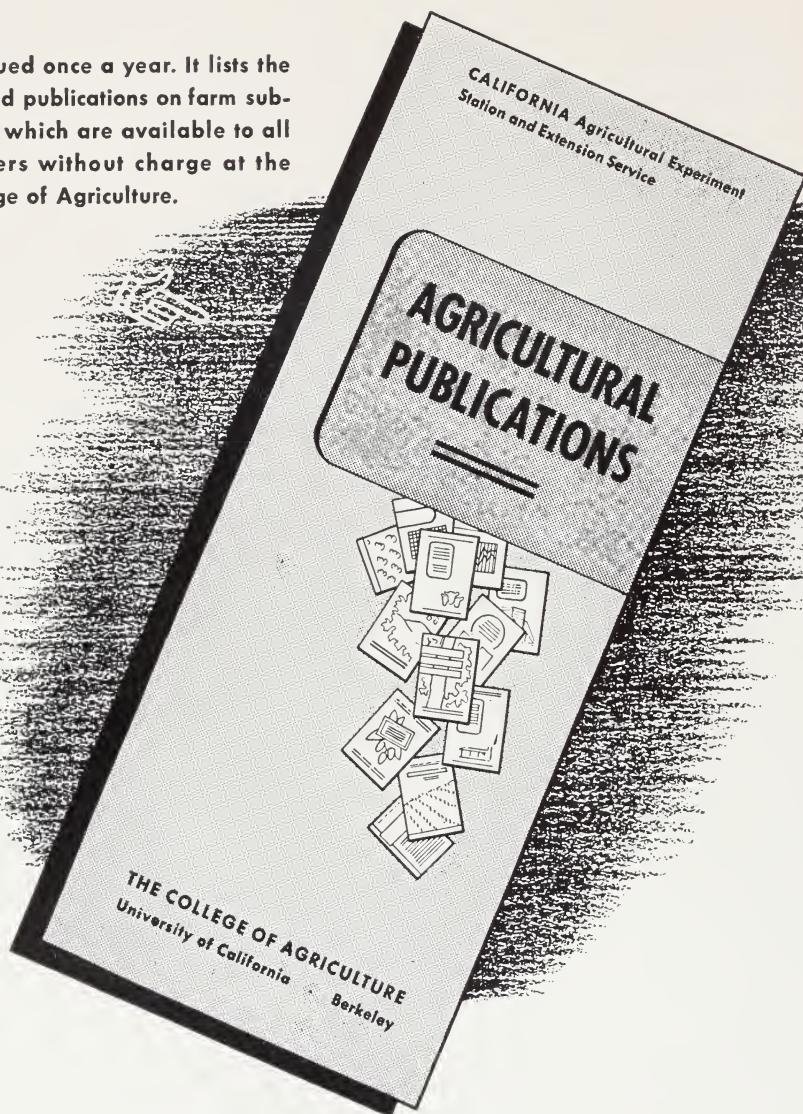


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